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(58) Field of search

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(54) Removal of wire reinforcement from hosepipe

(57) A method of forming a cuff (8) at the end of a hose of a type comprising an inner rubber layer (1), a layer of fabric (2), a wire reinforcement (3) wound helically around the fabric layer, and an outer rubber layer (4) overlying the wire reinforcement. A helical cut (5) is made around a region at the end

adhesive tape (6) is wrapped around the hose over the cut end of the wire. The hose can be secured to a diesel exhaust outlet pipe (9) by pushing the cuff over an end of the pipe and fastening a clamp (10) about the cuff to squeeze it firmly about the pipe.

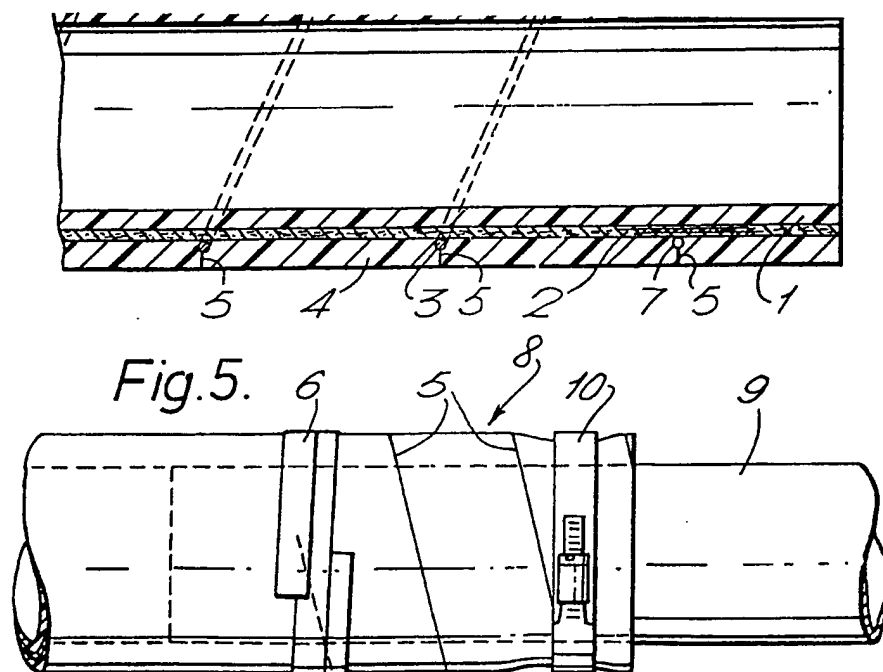
ERRATUM

SPECIFICATION NO 2009362A

Page 3, line 1, *after drawings.* Start new paragraph insert 12. A hose for use in a method according to any one of the preceding claims.

THE PATENT OFFICE
15 July 1980

Bas 77376/24



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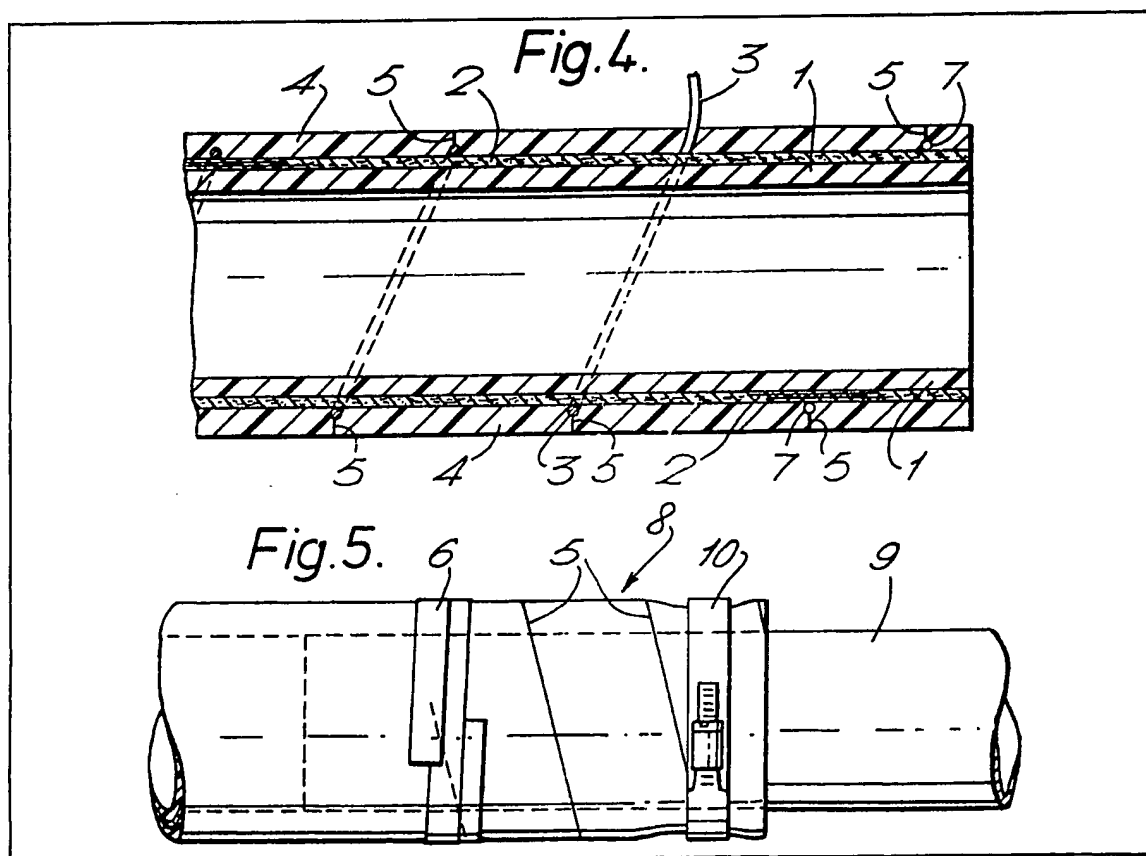
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adhesive tape (6) is wrapped around the hose over the cut end of the wire. The hose can be secured to a diesel exhaust outlet pipe (9) by pushing the cuff over an end of the pipe and fastening a clamp (10) about the cuff to squeeze it firmly about the pipe.



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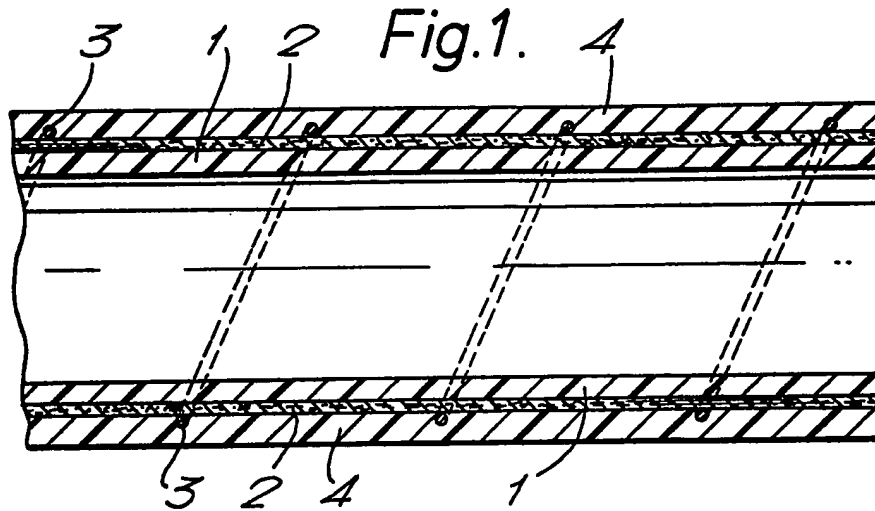
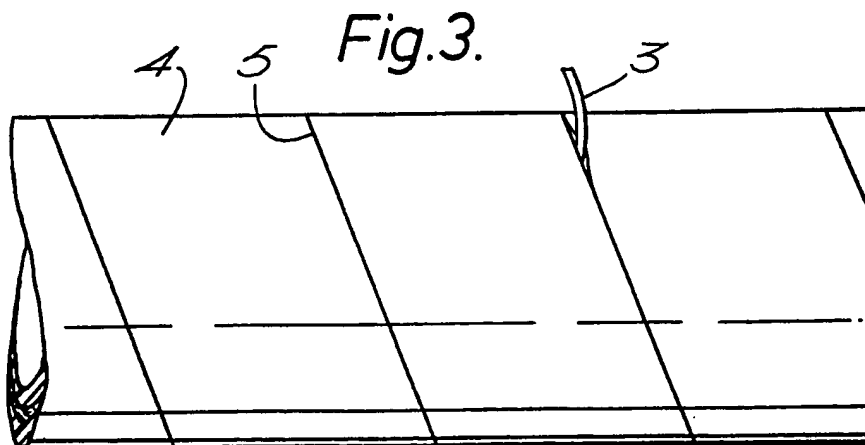
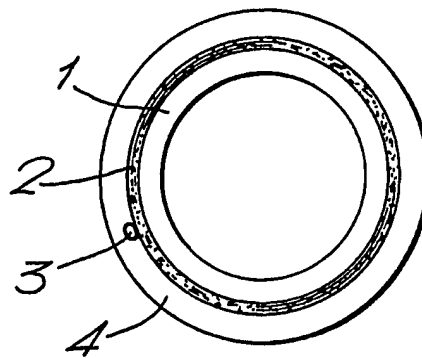
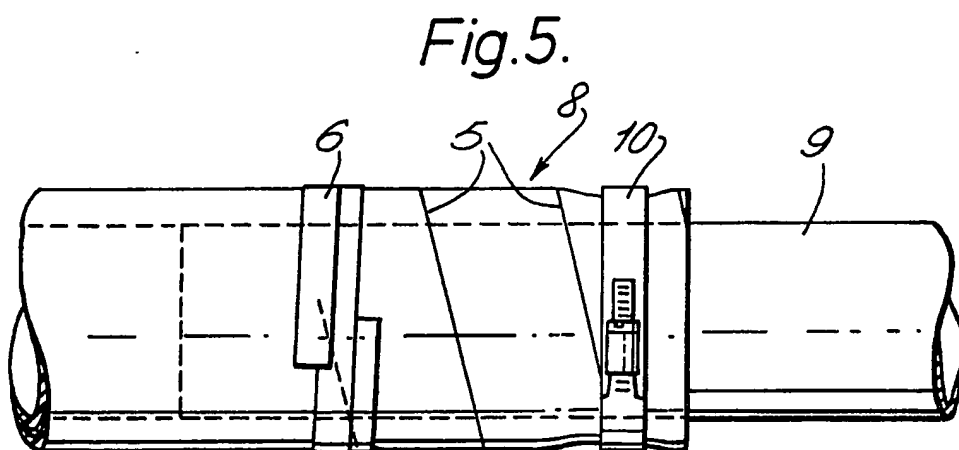
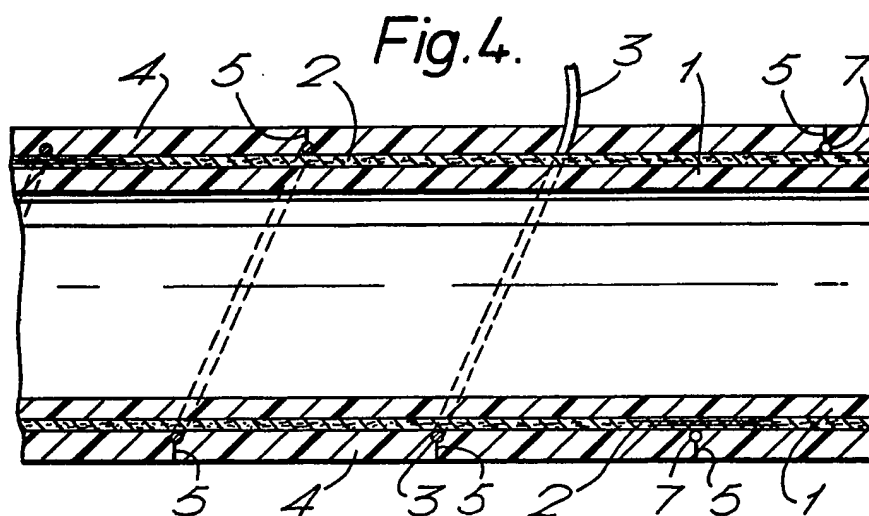


Fig.2.



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SPECIFICATION

Hoses

- 5 This invention relates to hoses, to methods of forming them and to methods of securing them to rigid tubular members.

The invention is particularly concerned with reinforced flexible hoses and with methods of

- 10 forming cuffs at their ends.

Hoses of the type comprising a rubber and fabric wall with a helical wire reinforcement have been used for providing flexible connections between pipes and other rigid tubular

- 15 members. The helical reinforcement in such hoses enables them to withstand high internal or external pressures whilst retaining a degree of flexibility along their length.

- Hoses are commonly attached to rigid pipes
20 by inserting the end of the pipe within one end of the hose and clamping the end of the hose securely about the pipe. Since those hoses having a wire reinforcement extending along their entire length are relatively rigid
25 about their diameter it is difficult to achieve a fluid-tight seal with a pipe by clamping the hose in the same manner. To overcome this problem it has been the practice in the past to manufacture hoses in which the wire reinforcement stops short of the end of the hose
30 thereby forming an end portion or cuff that is more flexible about its diameter. The cuff can then be deformed by clamping in the manner described so as to bring the inner surface of the cuff into intimate contact with the pipe
35 and so as to form an effective fluid-tight seal. Since, however, such hoses have to be pre-formed with a cuff at both ends it is necessary to manufacture a large range of different
40 lengths for use in different applications.

- In some previous hoses the wire reinforcement is sandwiched between two layers of fabric within the wall of the hose. It is possible, with such hoses, for the user himself to
45 produce a deformable cuff by pulling the wire out of the hose between the fabric layers, from one end. This, however, has the disadvantage that any adhesion between the fabric layers is destroyed in the region near the end
50 of the hose and, consequently, the structure of the hose is weakened.

- It is one object of the present invention to provide a method of forming a cuff at the end of a hose which alleviates the above-mentioned disadvantages.

- According to one aspect of the present invention there is provided a method of forming a cuff at the end of a hose of the type having a helical reinforcement member extending within a wall of flexible material, the
60 wall having an outer layer which covers said reinforcement member, wherein said method includes the steps of making a cut through said outer layer in a region extending from the
65 end of said hose, the cut following a helical

path overlying said reinforcement member and being to the depth of the reinforcement member, and removing said reinforcement member from said region by withdrawing said
70 reinforcement member through said cut.

The said reinforcement member may be in the form of a metal wire. The outer layer of said hose may be of rubber or another elastomeric material, and the wall may include a
75 layer of fabric underlying said reinforcement member.

According to another aspect of the present invention there is provided a hose for use in the aforementioned method.

- 80 According to a further aspect of the present invention there is provided a hose including a cuff formed in accordance with the aforementioned method.

- According to yet another aspect of the present invention there is provided a method of securing a hose to a rigid tubular member, the hose being of the type having a helical reinforcement member extending within a wall of flexible material, the wall having an outer
85 layer which covers said reinforcement member, the method comprising the steps of forming a cuff at an end of the hose by the aforementioned method, inserting the end of said tubular member within said cuff, and
90 clamping said cuff about said tubular member such as to form a fluid-tight seal between the tubular member and the hose.

- A hose having a deformable cuff at one end, a method of forming the cuff, and a
100 method of securing a hose to a rigid pipe, in accordance with the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:—

- 105 *Figure 1* is a cross-section along the length of a hose before formation of a cuff;
Figure 2 is an end view of the hose of *Fig. 1*;

- 110 *Figure 3* illustrates the hose at an intermediate stage of formation of the cuff;

Figure 4 is a cross-section along the length of the hose at the intermediate stage of formation of the cuff; and

- 115 *Figure 5* illustrates the hose in use after formation of the cuff.

The accompanying drawings show the wall of the hose to an expanded scale for ease of understanding.

- With reference to *Figs. 1* and *2*, the hose,
120 which is particularly for use in ducting the exhaust gases and coolant water of a marine diesel internal-combustion engine, is made substantially of rubber and has a helical reinforcement member which allows flexing of the
125 hose along its length whilst resisting deformation about its diameter caused by internal or external pressures. The hose comprises an inner vulcanised-rubber layer 1 that is overlaid with a second layer 2 formed of several plies
130 of a woven fabric material. A metal wire 3 is

helically wound about the fabric layer 2 along the entire length of the hose and is covered by an outer surface layer 4 also of vulcanised-rubber, within which the wire is embedded.

- 5 The hose is made as a continuous length which can be cut to size as required.

A deformable cuff is formed at the end of the hose by removing the wire 3 from a region at the end of the hose in the manner

- 10 shown in Figs. 3 and 4. A helical cut 5 is made through the outer layer 4 to the depth of the wire 3, the cut being aligned with the wire 3. The wire 3 is then pulled out through the cut 5 in the wall to the distance required and is cut off close to the outer surface of the hose. The protruding cut end of the wire 3 is bent back into the wall and secured in position by means of, for example, adhesive tape 6 (as shown in Fig. 5), or by a clip.

- 20 The wire need not necessarily be removed only following completion of the cut. The cut could, for example, be started and the wire pulled out as the cut is being made. The wire withdrawn need not be cut away but could be wound around the uncut portion of the hose and taped in position.

- A helical cavity 7 is formed in the outer layer 4 by the removal of the wire 3, and this provides a curved end to the cut 5 which helps prevent growth of the cut in the wall of the hose. The cut 5 may be left open or may be sealed by means of an adhesive, a solvent, such as rubber solution, or by adhesive tape.

- 35 The outer and inner layers 4 and 1 of the wall need not be of rubber but could be of another flexible or elastomeric material such as, for example, plastics material. Similarly, the reinforcing member 3 need not be a metal wire but could be in another form and of another material capable of providing suitable rigidity across the diameter of the hose for a particular application and might, for example, be a strip of resilient plastics or fibreglass material. The fabric layer 2 could be of web-less cord rather than woven fabric and could be of a natural fibre such as cotton, or an artificial fibre such as nylon or fibreglass, or could be a combination of these.

- Lengths of unmodified hose can be supplied to the user and the user himself can form a cuff at one end, or at both ends, as required. By pulling the wire through the outer surface, rather than the end surface, the integrity through the thickness of the hose wall is maintained, in the region of the cuff, and the structure of the hose is not therefore substantially weakened.

- The hose may be fitted to an exhaust outlet from an engine in the manner shown in Fig. 5. The cuff 8 of the hose is pushed over the end of an exhaust outlet pipe 9 such that a short length of the reinforced portion of the hose overlies the end of the pipe. A clip 10 is then placed around the cuff 8 and is tightened to squeeze the wall of the hose firmly

about the pipe 9 and into gas-tight engagement with it. Alternatively, a strap or a length of wire may be secured about the cuff 8 to keep the hose in place on the pipe 9.

- 70 The invention is not limited to application on hoses for use with exhaust outlets from engines but could be applied, for example, to hoses for use in making connection between pneumatic appliances and airlines, or could be applied to hoses for use in conveying other liquids or gases.

CLAIMS (30 Nov 1978)

1. A method of forming a cuff at the end of a hose of the type having a helical reinforcement member extending within a wall of flexible material, the wall having an outer layer which covers said reinforcement member, wherein said method includes the steps of making a cut through said outer layer in a region extending from the end of said hose, the cut following a helical path overlying said reinforcement member and being to the depth of the reinforcement member, and removing said reinforcement member from said region by withdrawing said reinforcement member through said cut.

2. A method according to Claim 1 including the step of cutting said reinforcement member close to the wall of the hose following withdrawal of the reinforcement member.

3. A method according to Claim 2 including the step of securing adhesive tape about said hose where the end of the reinforcement member is cut following withdrawal from said region.

4. A method according to any one of the preceding claims including the step of sealing the cut in the wall following withdrawal of said reinforcement member.

5. A method according to Claim 4, wherein said cut is sealed with a solvent.

6. A method according to any one of the preceding claims, wherein said reinforcement member is a metal wire.

7. A method according to any one of the preceding claims, wherein said outer layer is of an elastomeric material.

8. A method according to any one of the preceding claims, wherein said wall includes a layer of fabric underlying said reinforcement member.

9. A method according to any one of the preceding claims, wherein said wall comprises an outer layer of an elastomeric material, an inner layer of an elastomeric material, and a layer of fabric between said inner and outer layers and underlying said reinforcement member.

10. A method according to any one of the preceding claims, wherein said outer layer is of rubber.

11. A method of forming a cuff at the end of a hose, said method being substantially as hereinbefore described with reference to the

accompanying drawings.

13. A hose including a cuff formed by a method according to any one of Claims 1 to 11.

5 14. A hose including a cuff, said hose being substantially as hereinbefore described with reference to the accompanying drawings.

15 15. A method of securing a hose to a rigid tubular member, the hose being of the type having a helical reinforcement member extending within a wall of flexible material, the wall having an outer layer which covers said reinforcement member, the method comprising the steps of forming a cuff at an end of the hose by a method according to any one of Claims 1 to 11, inserting the end of said tubular member within said cuff, and clamping said cuff about said tubular member such as to form a fluid-tight seal between the
20 tubular member and the hose.

CLAIMS (22 Feb 1979)

Claim 12 deleted, subsequent claims renumbered.

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